REMARKS

- Claims 1-4 and 6-20 were previously pending.
- Claims 1, 2, 14, and 15 are currently amended.
- Claims 1-4 and 6-20 are currently pending.

Information Disclosure Statement

The IDS filed 13 January 2011 was found noncompliant. Applicant will attempt to correct the deficiencies and refile the IDS with the needed references.

Claim Amendments

Claims have been amended to clarify the subject matter. No new matter is added. Claims 1, 2, and 14 have been amended to retain "controller" in response to the Examiner's finding of non-responsiveness. The Remarks have been honed likewise.

Claim Rejections Under 35 USC § 103(a)

Claims 1-4 and 6-20 were rejected under 35 USC § 103(a) as being unpatentable over **Haugen** et al., "Simulation of Independent Reservoirs Couple by Global Production and Injection Constraints," in view of **Briens** et al., "Application of Sequential Staging of Tasks to Petroleum Reservoir Modeling," in view of U.S. Patent No. 6,108,608 to **Watts**, "Method of Estimating Properties of a Multi-Component Fluid Using Pseudocomponents," in view of **Scott** "Application of Parallel (MIMD) Computers to Reservoir Simulation."

Haugen

Applicant's specification (Publication No. 2007/0112547) specifically distinguishes Haugen from the claimed invention, at paragraph [0048]. (One of the authors of the Haugen reference is an inventor in the instant patent application.) The Haugen "coupled simulation" is limited to "black oil simulators." In Haugen, the simulators couple to each other: one simulator is designated master and one or more other simulators are slaves.

In contrast to Haugen, the claimed controller ***exists apart from*** all of the simulators being coupled, yet is able to couple with all of these simulators, to orchestrate an overall oilfield simulation involving all of the coupled simulators. The claimed controller has the coupling algorithms within itself. But the claimed controller is not itself a simulator…but instead, a controller.

Watts

Watts describes pseudo-components: utilized to estimate properties of a multi-component fluid. Watts does not teach, suggest, or contemplate an autonomous controller that can couple with simulators running different fluid models.

Scott & Briens

The Scott reference and the Briens reference invoke staging and allocating simulation tasks at a low level of computer architecture, with tasks being allotted among different processor chips. This is because at the time of their writing, the

Scott reference and the Briens reference sought to solve or enhance the problem of running ONE reservoir simulation with the computer processing power "typically" or "easily" available in about 1985-1988. The term "parallel computing," as used in these references appears to mean the same as the current "parallel computing" term-of-art. Likewise, the term "synchronous communication" as used in the Scott and Briens references appears to mean the same character-oriented or bit-oriented data transmission as the current term-of-art usage. Thus, the term "synchronous communication" as used in Scott and in Briens does not appear to mean "synchronization of time steps between different reservoir models being simulated in real time" on different simulators that is the subject of Applicant's claims.

The Applicant has no argument against the Examiner's position that parallel computing would speed up the computation of a processor-intensive reservoir model simulation, or that multiple simulations could run on multiple processors, and be communicatively coupled with each other, to advantage. These features do not read on the elements of Claims 1, 2 and 14 and do not render these claims obvious. Claims 1, 2, and 14 do not recite parallel computing as described by Scott or Briens. Moreover, Claims 1, 2, and 14 do recite speeding up a simulation. Multiple simulations running on multiple processors and being in communication with each other is only a foundation for the recited features of Claims 1, 2, and 14. For example, the elements of Claims 1, 2 and 14 include translating compositional models between simulators and controlling the

connected simulators so that they may progress together in time, while maintaining their own inherent time steps.

Independent Claims 1, 2 and 14

Independent Claims 1, 2, and 14 have been amended to more particularly point out and distinctly claim the subject matter recited. Since Haugen, Briens, Watts, and Scott, alone or in combination, do not teach or suggest all the features of any claim, the Applicant respectfully requests that the rejection under 35 USC § 103(a) be removed.

None of these references, alone or in combination, teach, suggest, or contemplate a standalone controller (or a method) that interfaces with diverse independent surface network simulators, black oil reservoir simulators, and compositional reservoir simulators, and that synchronizes these simulators under a variable time step that the controller chooses that allows the simulators to progress with their own times steps using their own models. The Applicant respectfully requests that the rejection under 35 USC § 103(a) be removed, and the claims be allowed.

The claimed controller's dialog with a given simulator is described in paragraphs [0019]-[0031] of the specification.

The coupling scheme used by the claimed controller between a single reservoir and a surface network is described, among other places, in paragraphs [0032]-[0037].

The network/reservoir balancing across time steps provided by the claimed controller is described in paragraphs [0038] –[0045].

The coupling scheme used by the claimed controller between multiple reservoirs and a surface network is described, among other places, in paragraphs [0049]-[0050].

The network/reservoir balancing across time steps provided by the claimed controller for a multi-reservoir and surface network coupling is described in paragraphs [0051] –[0052].

The translating of black oil and compositional models to a common fluid model by the claimed controller is described in paragraphs [0053]-[0070].

Claims 9-13

Claims 9-13 include the all the language and limitations of their base claim, claim 1. Thus, Applicant suggests that since claim 1 is allowable, claims 9-13 are allowable in turn.

Claims 3-4 and 6-8

Claims 3-4 and 6-8 include the all the language and limitations of their base claim, claim 2. Thus, Applicant suggests that since claim 2 is allowable, claims 3-4 and 6-8 are allowable in turn.

Claims 15-20

Claims 15-20 include the all the language and limitations of their base claim, claim 14. Thus, Applicant suggests that since claim 14 is allowable, claims 15-20 are allowable in turn.

Conclusion

Applicant submits that the pending Claims 1-4 and 6-20 are in condition for allowance and respectfully requests issuance of the subject application.

Respectfully Submitted,

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